OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **PINE ISLAND POND** the program coordinators recommend the following actions.

We are pleased to welcome the Manchester Urban Ponds Restoration Project to the New Hampshire Volunteer Lake Assessment Program. Manchester's volunteers collected a lot of samples this summer and we applaud them for their efforts. Although it takes a few years to establish lake quality trends, we hope that this project will encourage the citizens of the city to continue their active participation in sampling and help to reverse the degraded conditions of the ponds. We encourage the Project Coordinator to establish a wet weather sampling program in the future. Samples collected during rain events allow us to determine non-point sources of pollution to the lake. Since the project's goals include restoring the quality of the urban ponds and reducing pollutant loads data collected from wet weather sampling will allow biologists to better evaluate phosphorus loading to the lake.

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a, also a measure of algal abundance, in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The current data (the top graph) show in-lake chlorophyll-a was *stable* and below nuisance levels for the most part. In October, the chlorophyll-a concentration was almost six times higher than the average of the summer samples. We will watch for this to reoccur in the future. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The upper graph

shows a *fairly stable, but slightly declining,* in-lake transparency for this year. Transparency values were lower than the state mean. The high chlorophyll-a concentrations in October reduce the transparency reading in that month. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall cause more eroding of sediments into the lake and streams, thus decreasing clarity.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. These graphs show the in-lake phosphorus levels are very high. These values are much higher than the state median and many are considered more than desirable. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- The conductivity value of the Stormdrain 1 Inlet sampled on July 27 is highly suspect. We believe the reading should have been 3670 µS/cm, not 3.67. The person running the analysis might not have noticed the range switch on the conductivity meter from µS/cm to mS/cm. We hope the sample can be retaken next summer to confirm our belief.

- Dissolved oxygen readings were, for the most part, acceptable to support aquatic life (Table 9). The concentration was only diminished in the bottom meter in June and August.

NOTES

- Monitor's Note (5/16/00): 1 fisherman. New drainage from airport. Sewage smell on Pond Drive from drainage flow.

- Monitor's Note (6/29/00): People jumping off dam swimming. Milfoil. Orange/rust color to water.

- Monitor's Note (8/30/00): Airport construction ongoing. Inlet seems more cloudy than usual. Great blue herons noted.

- Monitor's Note (10/19/00): Hawk, mallards, mergansers noted.

USEFUL RESOURCES

Lake Protection Tips: Some Do's and Don'ts for Maintaining Healthy Lakes, WD-BB-9, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

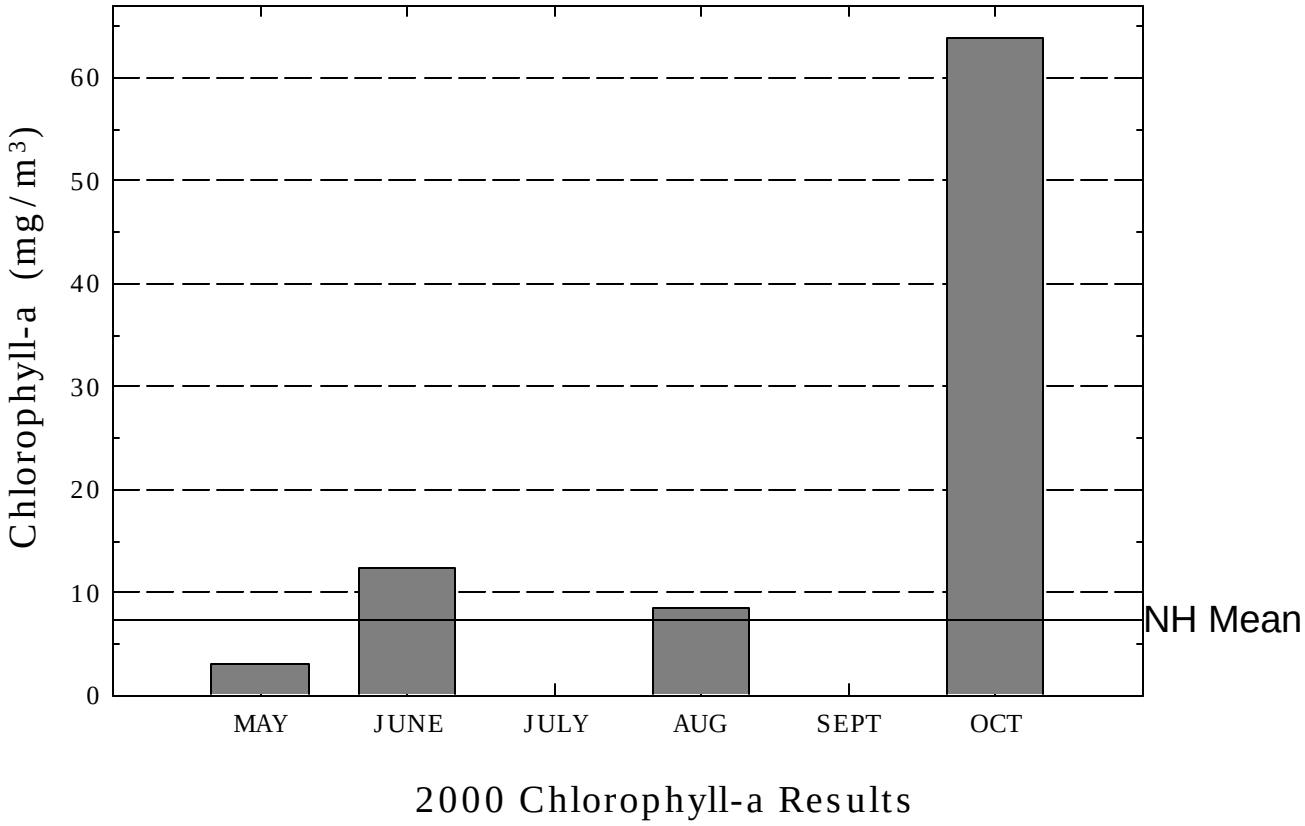
Effects of Phosphorus on New Hampshire's Lakes, NH Lakes Association pamphlet, (603) 226-0299 or www.nhlakes.org

The Watershed Guide to Cleaner Rivers, Lakes, and Streams, Connecticut River Joint Commissions, 1995. (603) 826-4800

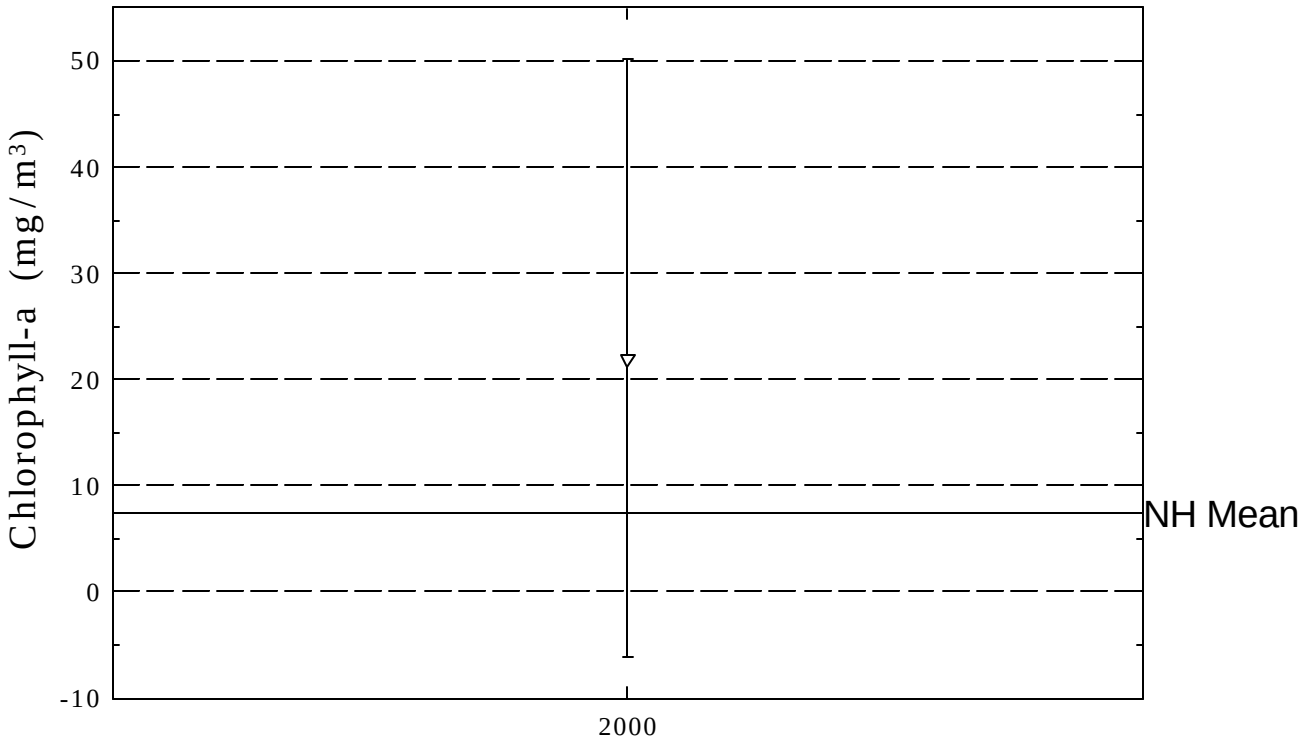
Answers to Common Lake Questions, NHDES-WSPCD-92-12, NHDES Booklet, (603) 271-3503.

Pine Island Pond

Figure 1. Monthly and Historical Chlorophyll-a Results



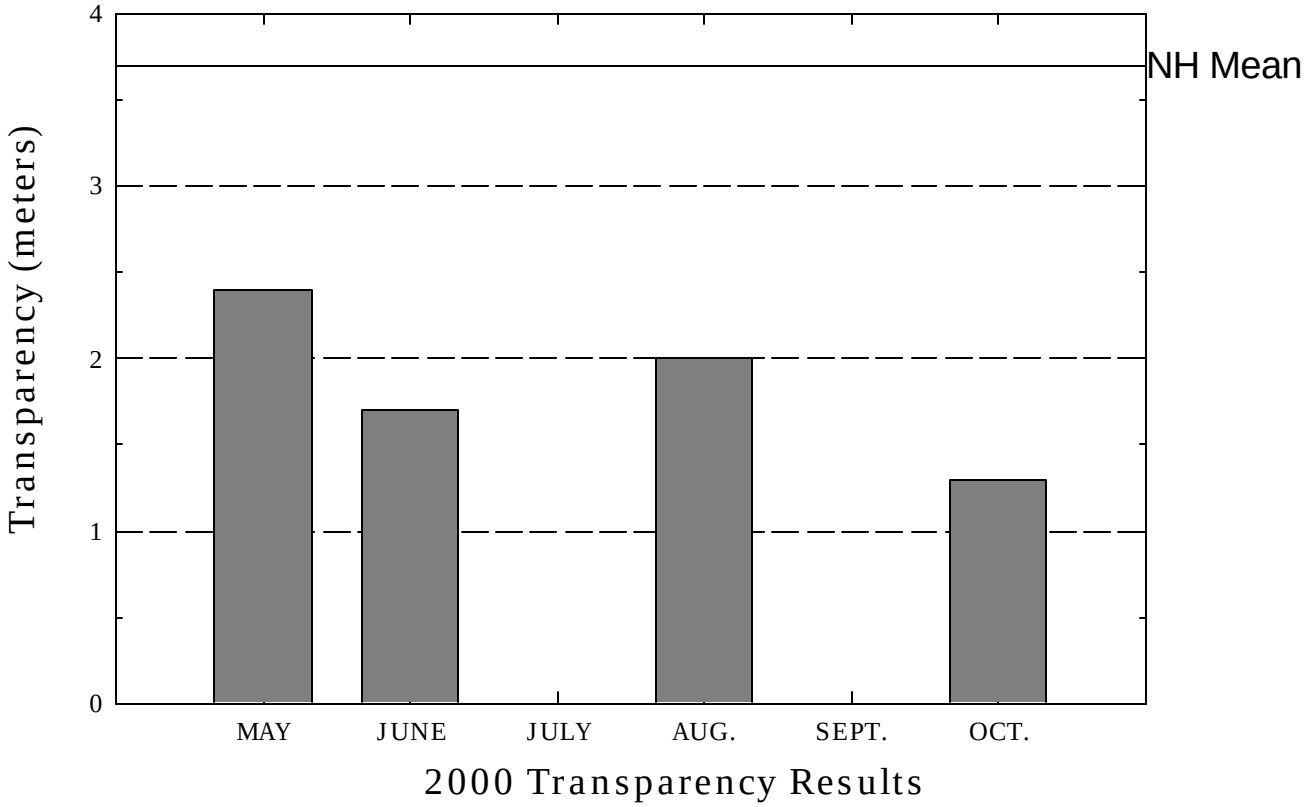
2000 Chlorophyll-a Results

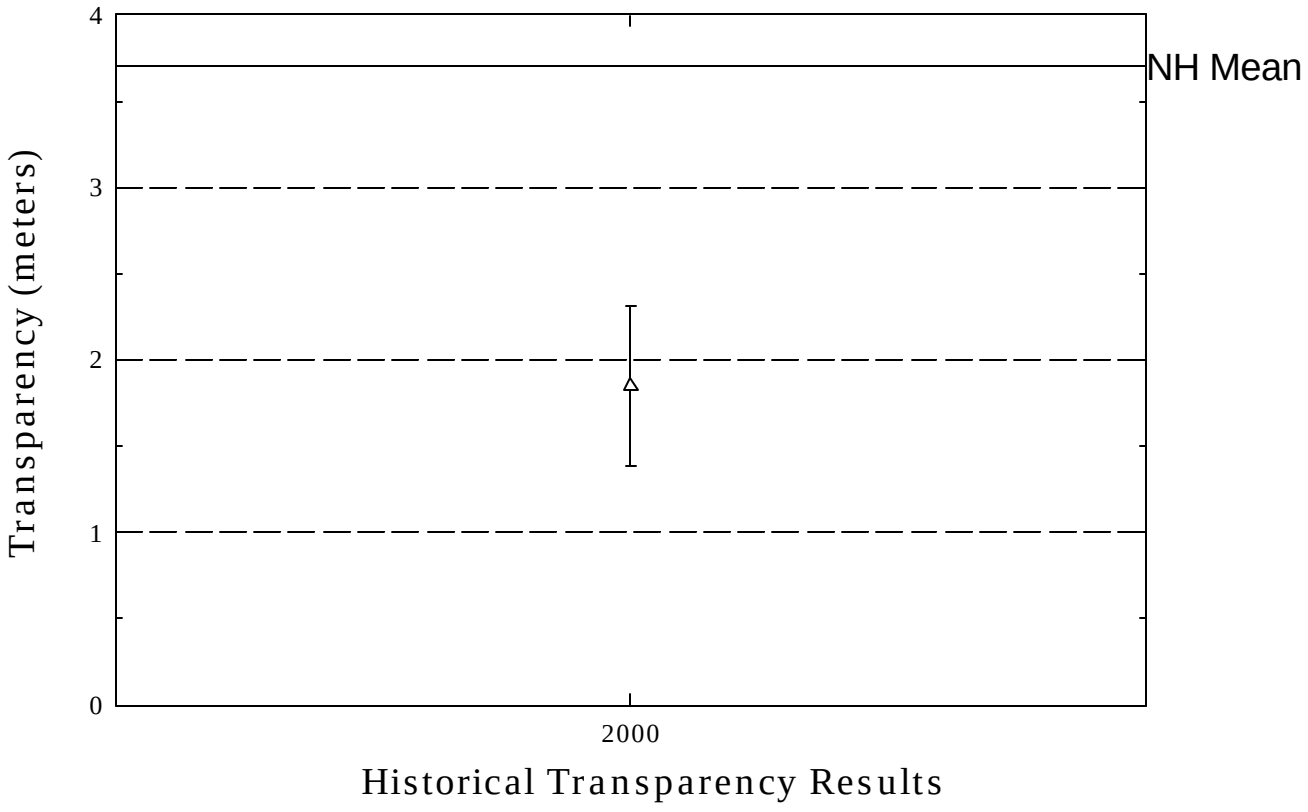


Historical Chlorophyll-a Results

Pine Island Pond

Figure 2. Monthly and Historical Transparency Results





Pine Island Pond

Figure 3. Monthly and Historical Total Phosphorus Data.

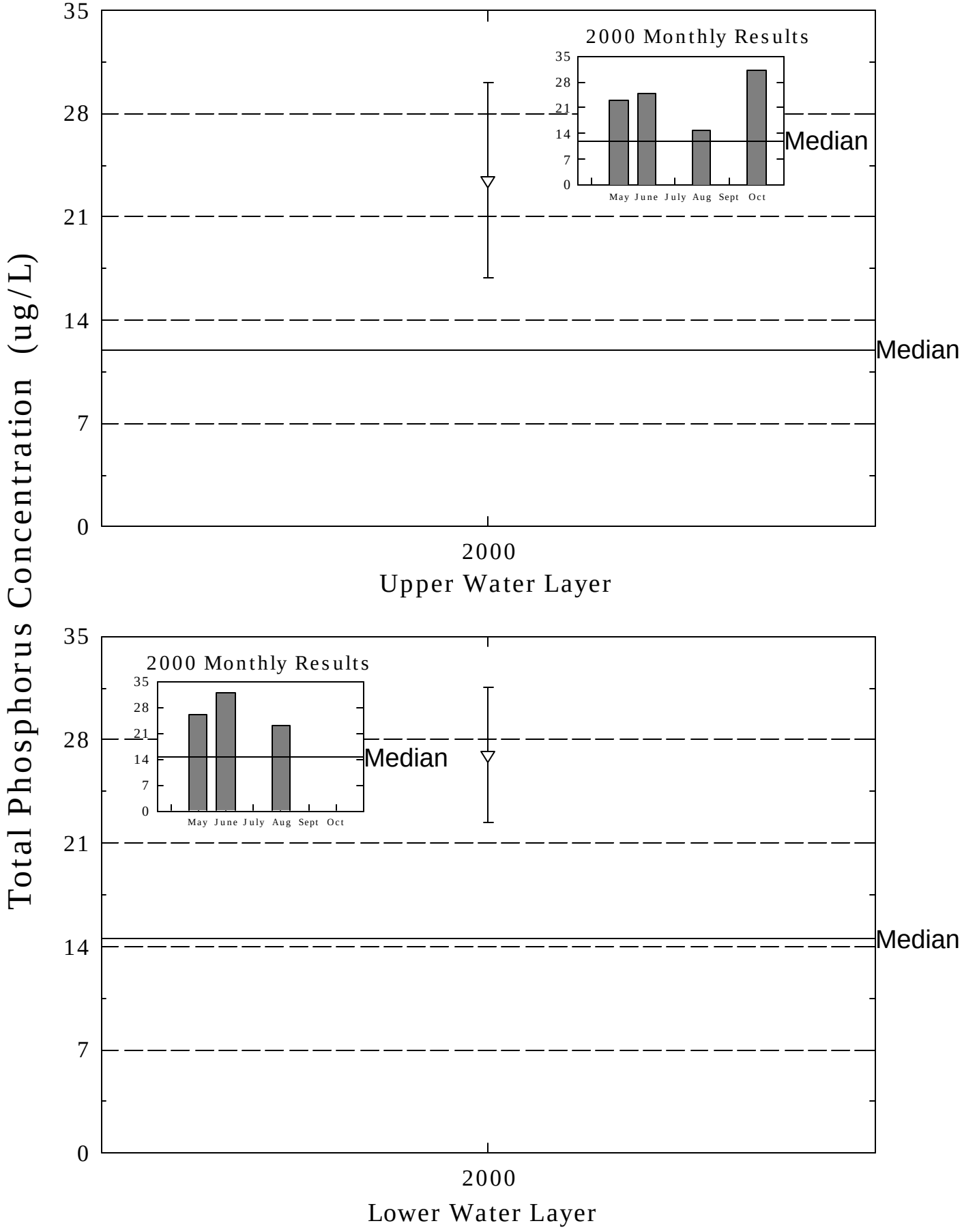


Table 1.

PINE ISLAND POND

MANCHESTER

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
2000	3.08	63.81	21.98

Table 2.

PINE ISLAND POND

MANCHESTER

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
05 / 16 / 2000	ASTERIONELLA	50
	MOUGEOTIA	14
	DYNOBRYON	14
06 / 29 / 2000	DINOBRYON	57
	ASTERIONELLA	15
	MALLOMONAS	10
08 / 30 / 2000	SYNURA	46
	CERATIUM	44
	RHIZOSOLENIA	5
10 / 19 / 2000	DINOBRYON	72
	MOUGEOTIA	14
	ASTERIONELLA	7

Table 3.

PINE ISLAND POND

MANCHESTER

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
2000	1.3	2.4	1.8

Table 4.

PINE ISLAND POND

MANCHESTER

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	2000	6.43	7.36	6.86
HYPOLIMNION				
	2000	6.55	6.87	6.69
INLET				
	2000	6.57	7.12	6.82
METALIMNION				
	2000	6.98	7.21	7.08
OUTLET				
	2000	6.65	7.36	6.99
STORMDRAIN 1 INLET				
	2000	6.24	6.24	6.24

Table 5.

PINE ISLAND POND

MANCHESTER

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
2000	6.60	22.80	17.10

Table 6.

PINE ISLAND POND
MANCHESTER

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	2000	160.2	372.0	287.0
HYPOLIMNION				
	2000	158.5	340.0	255.8
INLET				
	2000	154.9	394.0	269.4
METALIMNION				
	2000	292.0	341.0	316.5
OUTLET				
	2000	158.6	342.0	272.9
STORMDRAIN 1 INLET				
	2000	3.6	3.6	3.6

Table 8.

PINE ISLAND POND

MANCHESTER

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	2000	15	31	23
HYPOLIMNION				
	2000	23	32	27
INLET				
	2000	11	33	24
METALIMNION				
	2000	19	30	24
OUTLET				
	2000	14	30	21
STORMDRAIN 1 INLET				
	2000	35	35	35

Table 9.

PINE ISLAND POND

MANCHESTER

Current year dissolved oxygen and temperature data.

Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
		June 29, 2000	
0.1	26.4	7.5	96.0
1.0	24.0	6.6	78.0
2.0	20.7	4.8	49.0
3.0	15.6	0.5	5.0
		August 30, 2000	
0.1	23.7	8.0	96.0
1.0	22.7	7.6	87.0
2.0	20.6	7.1	79.0
3.0	18.0	0.2	2.0
3.5	16.8	0.1	1.0
		October 19, 2000	
0.1	12.6	9.0	84.0
1.0	12.1	8.7	80.0
2.0	11.6	8.5	79.0
3.0	11.6	6.1	58.0

Table 10.

PINE ISLAND POND

MANCHESTER

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
June 29, 2000	3.0	15.6	0.5	5.0
August 30, 2000	3.5	16.8	0.1	1.0
October 19, 2000	3.0	11.6	6.1	58.0

Table 11.

PINE ISLAND POND
MANCHESTER

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	2000	0.9	2.3	1.3
HYPOLIMNION				
	2000	1.0	4.2	2.2
INLET				
	2000	0.9	5.5	2.5
METALIMNION				
	2000	1.2	1.5	1.4
OUTLET				
	2000	0.8	1.3	1.0
STORMDRAIN 1 INLET				
	2000	18.5	18.5	18.5